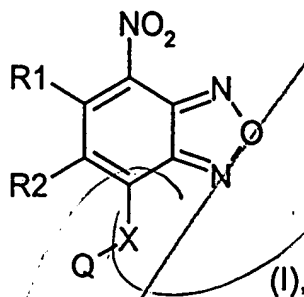


## PATENT CLAIMS

1. Use of 4-nitro-2,1,3-benzoxadiazole derivatives of general formula (I) as dyes in colorants for keratin fibers



wherein

X denotes oxygen, sulfur or  $\text{NR}^a$ ,  $\text{R}^a$  standing for hydrogen, a  $(\text{C}_1\text{-C}_4)$ -alkyl group, a monohydroxy- $(\text{C}_1\text{-C}_4)$ -alkyl group, a polyhydroxy- $(\text{C}_2\text{-C}_4)$ -alkyl group or a mono- $(\text{C}_1\text{-C}_4)$ -alkoxy- $(\text{C}_1\text{-C}_4)$ -alkyl group;

R1 and R2 can be equal or different and independently of each other denote hydrogen, a halogen atom, a  $(\text{C}_1\text{-C}_4)$ -alkyl group, a halogen-substituted  $(\text{C}_1\text{-C}_4)$ -alkyl group, a  $(\text{C}_1\text{-C}_4)$ -alkoxy group, a nitro group or an  $\text{NR}^b\text{R}^c$  group, the  $\text{R}^b$  and  $\text{R}^c$  groups being equal or different and independently of each other denoting hydrogen, a  $(\text{C}_1\text{-C}_4)$ -alkyl group, an optionally substituted aromatic carbon ring or a  $(\text{C}_1\text{-C}_4)$ -alkanecarbonyl group, or  $\text{R}^b$  and  $\text{R}^c$  together with the nitrogen atom forming a heterocyclic  $(\text{C}_3\text{-C}_6)$  group;

Q denotes hydrogen, an aliphatic group, an aromatic isocyclic group or an aromatic heterocyclic group.

2. Use according to Claim 1, characterized in that in formula (I): Q denotes methyl, ethyl, phenyl, biphenyl,  $\text{C}_6\text{H}_4\text{R}_3$ ,  $\text{C}_6\text{H}_3\text{R}_3\text{R}_4$  or  $\text{C}_6\text{H}_2\text{R}_3\text{R}_4\text{R}_5$

wherein R3, R4 and R5 are equal or different and independently of each other stand for F, Cl, Br, I, CN,  $\text{NO}_2$ ,  $\text{CF}_3$ ,  $(\text{C}_1\text{-C}_4)$ -alkyl,  $(\text{C}_1\text{-C}_4)$ -alkoxy, monohydroxy- $(\text{C}_1\text{-C}_4)$ -alkyl, polyhydroxy- $(\text{C}_2\text{-C}_4)$ -alkyl, mono- $(\text{C}_1\text{-C}_4)$ -alkoxy- $(\text{C}_1\text{-C}_4)$ -alkyl,  $(\text{C}_1\text{-C}_4)$ -alkylthio, hydroxy,  $\text{NR}^d\text{R}^e$ , CHO,  $\text{COR}^f$ , COOH,  $\text{COOR}^g$ ,  $\text{CONHR}^h$  or  $\text{NHCOR}^i$  wherein  $\text{R}^d$  and  $\text{R}^e$  independently of each other denote hydrogen, a  $(\text{C}_1\text{-C}_4)$ -alkyl group, a monohydroxy- $(\text{C}_1\text{-C}_4)$ -alkyl group, a polyhydroxy- $(\text{C}_2\text{-C}_4)$ -alkyl group or an optionally substituted aromatic carbon ring, and  $\text{R}^f$ ,  $\text{R}^g$ ,  $\text{R}^h$  and  $\text{R}^i$  independently of each other denote a  $(\text{C}_1\text{-C}_4)$ -alkyl group or an optionally substituted aromatic carbon ring.

3. Use according to Claim 1 or 2, characterized in that in formula (I) X denotes oxygen or  $\text{NR}^a$ , with  $\text{R}^a$  denoting hydrogen, a  $(\text{C}_1\text{-C}_4)$ -alkyl group, a monohydroxy- $(\text{C}_1\text{-C}_4)$ -alkyl group, a polyhydroxy- $(\text{C}_2\text{-C}_4)$ -alkyl group or a mono- $(\text{C}_1\text{-C}_4)$ -alkoxy- $(\text{C}_1\text{-C}_4)$ -alkyl group;

$\text{R}_1 = \text{R}_2 =$  hydrogen; Q stands for methyl, ethyl, phenyl, biphenyl,  $\text{C}_6\text{H}_4\text{R}_3$ ,  $\text{C}_6\text{H}_3\text{R}_3\text{R}_4$  or  $\text{C}_6\text{H}_2\text{R}_3\text{R}_4\text{R}_5$  wherein  $\text{R}_3$ ,  $\text{R}_4$  and  $\text{R}_5$  are equal or different and independently of each other stand for F, Cl, Br, I, CN,  $\text{NO}_2$ ,  $\text{CF}_3$ ,  $(\text{C}_1\text{-C}_4)$ -alkyl,  $(\text{C}_1\text{-C}_4)$ -alkoxy, monohydroxy- $(\text{C}_1\text{-C}_4)$ -alkyl, polyhydroxy- $(\text{C}_2\text{-C}_4)$ -alkyl, mono- $(\text{C}_1\text{-C}_4)$ -alkoxy- $(\text{C}_1\text{-C}_4)$ -alkyl,  $(\text{C}_1\text{-C}_4)$ -alkylthio, hydroxy,  $\text{NR}^d\text{R}^e$ , CHO,  $\text{COR}^f$ , COOH,  $\text{COOR}^g$ ,  $\text{CONHR}^h$  or  $\text{NHCOR}^i$ , wherein  $\text{R}^d$  and  $\text{R}^e$  independently of each other denote hydrogen, a  $(\text{C}_1\text{-C}_4)$ -alkyl group, a monohydroxy- $(\text{C}_1\text{-C}_4)$ -alkyl group, a polyhydroxy- $(\text{C}_2\text{-C}_4)$ -alkyl group or an optionally substituted aromatic carbon ring, and  $\text{R}^f$ ,  $\text{R}^g$ ,  $\text{R}^h$  and  $\text{R}^i$  independently of each other denote a  $(\text{C}_1\text{-C}_4)$ -alkyl group or an optionally substituted aromatic carbon ring.

4. Use according to one of Claims 1 to 3, characterized in that the compound of formula (I) is selected from among 4-amino-7-nitro-2,1,3-benzoxadiazole; 4-N,N-dimethylamino-7-nitro-2,1,3-benzoxadiazole; 4-nitro-7-methoxy-2,1,3-benzoxadiazole; 4-nitro-7-ethoxy-2,1,3-benzoxadiazole; 4-nitro-7-phenoxy-2,1,3-benzoxadiazole; 4-nitro-7-(4'-nitrophenoxy)-2,1,3-benzoxadiazole; 4-nitro-7-(2',4',6'-trimethylphenoxy)-2,1,3-benzoxadiazole; 7-nitro-4-(N-phenylamino)-2,1,3-benzoxadiazole; 4-[N-(1-naphthalenyl)amino]-7-nitro-2,1,3-benzoxadiazole; 4-[N-(4'-chlorophenyl)amino]-7-nitro-2,1,3-benzoxadiazole; 4-[N-(4'-fluorophenyl)amino]-7-nitro-2,1,3-benzoxadiazole; 7-nitro-4-[N-(4'-nitrophenyl)amino]-2,1,3-benzoxadiazole; 7-nitro-4-[N-(3'-nitrophenyl)amino]-2,1,3-benzoxadiazole; 4-[N-(2',4'-dinitrophenyl)amino]-7-nitro-2,1,3-benzoxadiazole; 4-[(7-nitro-2,1,3-benzoxadiazol-4-yl)amino]benzotrile; 4-[N-(4'-methylphenyl)amino]-7-nitro-2,1,3-benzoxadiazole; 4-[N-(2'-methylphenyl)amino]-7-nitro-2,1,3-benzoxadiazole; 4-[N-(4'-methoxyphenyl)amino]-7-nitro-2,1,3-benzoxadiazole; 4-[(7-nitro-2,1,3-benzoxadiazol-4-yl)amino]phenol; 4-[(7-nitro-2,1,3-benzoxadiazol-4-yl)amino]-3-chloro-5-nitrophenol; 3-[(7-nitro-2,1,3-benzoxadiazol-4-yl)amino]phenol; 2-[(7-nitro-2,1,3-benzoxadiazol-4-yl)amino]phenol; N-(7-nitro-2,1,3-benzoxadiazol-4-yl)-1,4-diaminobenzene; N,N-dimethyl-N'-(7-nitro-2,1,3-benzoxadiazol-4-yl)-1,4-diaminobenzene; N-(7-nitro-2,1,3-benzoxadiazol-4-yl)-2-(2'-hydroxyethyl)-1,4-diaminobenzene; N-(7-nitro-2,1,3-benzoxadiazol-4-yl)-2-(1'-

hydroxyethyl)-1,4-diaminobenzene; N-(7-nitro-2,1,3-benzoxadiazol-4-yl)-2-methoxymethyl-1,4-diaminobenzene; N,N-di-(2'-hydroxyethyl)-N'-(7-nitro-2,1,3-benzoxadiazol-4-yl)-2-nitro-1,4-diaminobenzene; methyl 4-[(7-nitro-2,1,3-benzoxadiazol-4-yl)amino]benzoate; 4-nitro-7-(phenylthio)-2,1,3-benzoxadiazole; 4-[(4'-chlorophenyl)thio]-7-nitro-2,1,3-benzoxadiazole; 4-[(3'-chlorophenyl)thio]-7-nitro-2,1,3-benzoxadiazole; 4-[(4'-bromophenyl)thio]-7-nitro-2,1,3-benzoxadiazole; 4-[(4'-methylphenyl)thio]-7-nitro-2,1,3-benzoxadiazole; 4-[(3'-methoxyphenyl)thio]-7-nitro-2,1,3-benzoxadiazole; 4-nitro-7-[(4'-nitrophenyl)thio]-2,1,3-benzoxadiazole; 2-[(7-nitro-2,1,3-benzoxadiazol-4-yl)thio]benzoic acid; 5,7-dinitro-N-phenyl-4-amino-2,1,3-benzoxadiazole; 4-{N-[(1,1'-biphenyl)-4-yl]amino}-5,7-dinitro-2,1,3-benzoxadiazole; 4-[N-(4'-chlorophenyl)amino]-5,7-dinitro-2,1,3-benzoxadiazole; 4-[N-(4'-bromophenyl)amino]-5,7-dinitro-2,1,3-benzoxadiazole; 4-[N-(3'-bromophenyl)amino]-5,7-dinitro-2,1,3-benzoxadiazole; 5,7-dinitro-4-[N-(4'-nitrophenyl)amino]-2,1,3-benzoxadiazole; 5,7-dinitro-4-[N-(3'-nitrophenyl)amino]-2,1,3-benzoxadiazole; 4-[N-(4'-methoxyphenyl)amino]-5,7-dinitro-2,1,3-benzoxadiazole; 4-[N-(4'-methylphenyl)amino]-5,7-dinitro-2,1,3-benzoxadiazole; N'-(5,7-dinitro-2,1,3-benzoxadiazol-4-yl)-N,N-dimethyl-1,4-diaminobenzene; 3-[(5,7-dinitro-2,1,3-benzoxadiazol-4-yl)amino]phenol; 4-(N-methyl-N-phenylamino)-7-nitro-2,1,3-benzoxadiazole or 4-(N-ethyl-N-phenylamino-7-nitro-2,1,3-benzoxadiazole and 4-[N-(2'-hydroxyethyl)-N-[4-di-(2'-hydroxyethyl)-2-nitrophenylamino]-7-nitro-2,1,3-benzoxadiazole.

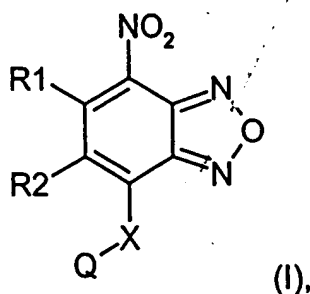
5. Use according to Claim 4, characterized in that the compound of formula (I) is selected from among 4-nitro-7-methoxy-2,1,3-benzoxadiazole; 4-nitro-7-ethoxy-2,1,3-benzoxadiazole; 4-nitro-7-phenoxy-2,1,3-benzoxadiazole; 7-nitro-4-(N-phenylamino)-2,1,3-benzoxadiazole; 4-[N-(4'-methylphenyl)amino]-7-nitro-2,1,3-benzoxadiazole; 4-[N-(4'-methoxyphenyl)amino]-7-nitro-2,1,3-benzoxadiazole; 4-[(7-nitro-2,1,3-benzoxadiazol-4-yl)amino]phenol; 3-[(7-nitro-2,1,3-benzoxadiazol-4-yl)amino]phenol; 2-[(7-nitro-2,1,3-benzoxadiazol-4-yl)amino]phenol; 4-[(7-nitro-2,1,3-benzoxadiazol-4-yl)amino]-3-chloro-5-nitrophenol; N-(7-nitro-2,1,3-benzoxadiazol-4-yl)-1,4-diaminobenzene; N-(7-nitro-2,1,3-benzoxadiazol-4-yl)-2-(2'-hydroxyethyl)-1,4-diaminobenzene; N-(7-nitro-2,1,3-benzoxadiazol-4-yl)-2-(1'-hydroxyethyl)-1,4-diaminobenzene; N-(7-nitro-2,1,3-benzoxadiazol-4-yl)-2-(methoxymethyl)-1,4-diaminobenzene; N,N-dimethyl-N'-(7-nitro-2,1,3-benzoxadiazol-4-yl)-1,4-diaminobenzene; N,N-di-(2'-hydroxyethyl)-N'-(7-nitro-2,1,3-benzoxadiazol-4-yl)-

2-nitro-1,4-diaminobenzene and 4-(N-(2'-hydroxyethyl-N-[4-di-(2'-hydroxyethyl)-2-nitrophenylamino]-7-nitro-2,1,3-benzoxadiazole.

6. Use according to one of Claims 1 to 5, characterized in that in the colorant employed the compound of formula (I) is used in an amount from 0.01 to 10 wt. %.

7. Use according to one of Claims 1 to 6, characterized in that the compound of formula (I) is used for dyeing hair.

8. Cosmetic preparation for dyeing keratin fibers, characterized in that it contains at least one 4-nitro-2,1,3-benzoxadiazole derivative of general formula (I)



wherein

X denotes oxygen, sulfur or NR<sup>a</sup>, R<sup>a</sup> standing for hydrogen, a (C<sub>1</sub>-C<sub>4</sub>)-alkyl group, a monohydroxy-(C<sub>1</sub>-C<sub>4</sub>)-alkyl group, a polyhydroxy-(C<sub>2</sub>-C<sub>4</sub>)-alkyl group or a mono-(C<sub>1</sub>-C<sub>4</sub>)-alkoxy-(C<sub>1</sub>-C<sub>4</sub>)-alkyl group,

R1 and R2 can be equal or different and independently of each other denote hydrogen, a halogen atom, a (C<sub>1</sub>-C<sub>4</sub>)-alkyl group, a halogen-substituted (C<sub>1</sub>-C<sub>4</sub>)-alkyl group, a (C<sub>1</sub>-C<sub>4</sub>)-alkoxy group, a nitro group or an NR<sup>b</sup>R<sup>c</sup> group, the R<sup>b</sup> and R<sup>c</sup> groups being equal or different and independently of each other denoting hydrogen, a (C<sub>1</sub>-C<sub>4</sub>)-alkyl group, an optionally substituted aromatic carbon ring or a (C<sub>1</sub>-C<sub>4</sub>)-alkanecarbonyl group, or R<sup>b</sup> and R<sup>c</sup> together with the nitrogen atom forming a heterocyclic (C<sub>3</sub>-C<sub>6</sub>) group; and Q denotes hydrogen, an aliphatic group, an aromatic isocyclic group or an aromatic heterocyclic group.

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9. Cosmetic preparation according to Claim 8, characterized in that it contains additionally at least one known direct dye from the group of anionic or cationic dyes, nitro dyes, azo dyes, anthraquinone dyes, triphenylmethane dyes or disperse dyes.

10. Cosmetic preparation according to Claim 8 or 9, characterized in that it additionally contains at least one natural or synthetic polymer or at least one modified polymer of natural origin commonly used in cosmetics and that it is in the form of a shade fixative or color fixative.

11. Cosmetic preparation according to one of Claims 8 to 10, characterized in that it additionally contains an oxidation dye precursor.

12. Cosmetic preparation according to one of Claims 8 to 11, characterized in that it is mixed with an oxidant before use.

13. Cosmetic preparation according to one of Claims 8 to 12, characterized in that it is a hair colorant.

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